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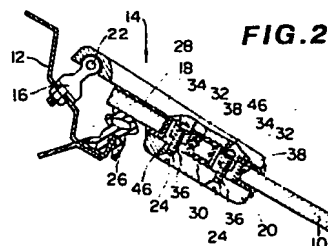
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64 Hinge for a brittle object.

67 A hinge (14) includes first and second members (16,18), a backing member (20), and a connecting member (24). The connecting member (24) connects the backing member (20) to the second member (18) in such a manner as to be able to vary the distance between the second and backing members. A brittle object (10) is located between the second and backing members (18,20). First and second packings (28,30) are provided between the brittle object (10) and the second member (18), and between the brittle object (10) and the backing member (20), respectively. A spacer (46) is provided between the second and backing members. The dimension of the spacer (46) along the distance between the second and backing members (18,20) is chosen so that when the connecting member (24) is adjusted until the spacer (46) comes into contact with both the second and backing members (18,20), the second and backing members clamp therebetween the brittle object (10) by way of the packings (28,30) with an optimal clamping force exerted on the brittle object (10).



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HINGE FOR A BRITTLE OBJECT

This invention relates to a hinge for pivotally connecting a brittle object and another object, and to, for example, that for hinging a glazed back-door to the body of a station wagon or coupé-type automotive
5 vehicle.

Some of the prior art automotive vehicles, such as station wagons or coupés, have back doors made of window glazing, which are pivotally mounted on the
10 vehicle bodies by hinges. One type of these hinges has a movable member and a backing member, which clamp therebetween part of the glass of the door with packings interposed between the glass and both members to protect the door glazing. The distance between the
15 members can be changed by screws to adjust the clamping force on the glass. However, it is usually difficult to easily adjust the clamping force to an optimal level which ensures reliable clamping of the glass of the door without damaging it.

20 It is an object of this invention to provide a hinge for a brittle object, such as a glass, which can easily set the clamping force on the object to an optimal level.

25 In accordance with this invention, a hinge for a brittle object, such as a glass, includes a first

member pivotally connected to said movable member forming a second member, said backing member and a connecting member. The connecting member adjustably connects the backing member to the second member in
5 such a manner that the distance between the second and backing members varies as the connecting member is adjusted. As known per se, part of the brittle object is located and clamped between the second and backing members. The hinge also includes deformable first and
10 second packings provided between the brittle object and the second member, and between the brittle object and the backing member, respectively. The hinge further includes a spacer provided between the second and backing members. The dimension of the spacer,
15 parallel to the distance between the second and backing members, is greater than that of the brittle object but smaller than the sum of that of the brittle object and those of the respective packings in the original conditions. This dimensional feature ensures
20 that when the connecting member is adjusted until the spacer comes into contact with both the second and backing members, the second and backing members clamp therebetween the brittle object by way of the packings with a predetermined clamping force exerted on the
25 brittle object.

The above and other objects, features and advantages of the present invention will be apparent from the following description of a preferred embodiment
30 thereof, taken in conjunction with the drawings, wherein:

Figure 1 is a perspective view of the rear of an automotive vehicle having a glazed back-door which is
35 pivoted to the vehicle body by means of hinges of this invention;

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Figure 2 is a cross-sectional view of the hinge of Figure 1 taken along line II-II of Figure 1;

Figure 3 is an enlarged view of an essential portion
5 of the hinge in Figure 2; and

Figure 4 is a perspective view of the spacer of Figures 2 and 3.

10 With reference to Figure 1, there is shown the rear of an automotive vehicle, which has a glazed back-door 10 pivotally mounted on the rear edge of the roof panel of a vehicle body 12 by means of a pair of hinges 14 of this invention. The two hinges 14 are identical.

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As shown in Figure 2, the hinge 14 has a stationary first member 16, a movable second member 18, and a backing member 20. One edge of the movable member 18 is pivoted at 22 to one end of the stationary member
20 16. The other end of the stationary member 16 is bolted to the vehicle body roof panel 12. The movable member 18 is thus free to rotate about the pivot 22. The movable and backing members 18 and 20 essentially consist of substantially flat plates. The backing
25 plate 20 is connected in parallel with the movable plate 18 by means of a plurality of screws 24.

The back door 10 essentially consists of a sheet of window glazing or glass, and is clamped securely
30 between the movable and backing plates 18 and 20 in a parallel manner to be hinged virtually to the roof panel 12. Thus, the door glass 10 is free to pivot in conjunction with the movable plate 18 of the hinge 14. The rearward edges of the movable and backing plates
35 18 and 20 are aligned. The backing plate 20 is shorter in total longitudinal length than the movable plate 18, so that the plate 18 extends frontward

- beyond the plate 20. The plates 18 and 20 are outside and inside the vehicle respectively. Similarly, the door glass 10 extends frontward beyond the plate 20 but not as far as plate 18. A weatherstrip 26 is provided between the rear edge of the roof panel 12 and the front edge of the door glass 10 to prevent ingress of rain water into the interior of the vehicle without hampering movement of the door 10.
- 10 As shown in Figures 2 and 3, sheets of deformable or resilient packings, for example, gaskets 28 and 30 are provided between the door glass 10 and the plate 18, and between the door glass 10 and the plate 20, respectively, to prevent ingress of rain water into the interior of the vehicle and protect the door glass 10. The movable plate 18 has a plurality of bosses 32 of circular cross-section, which protrude perpendicularly from the rest of the plate 18 toward the plate 20. The movable plate 18 also has a plurality of threaded holes 34, which are coaxial with the bosses 32 respectively and open at the distal ends of the bosses 32 respectively. The backing plate 20 has therethrough a plurality of non-threaded holes 36 aligned with the respective holes 34. The door glass 10 has therethrough a plurality of holes 38 of circular cross-section aligned with the respective holes 34 and 36. The packings 28 and 30 respectively have therethrough a plurality of circular openings 42 and 44 substantially aligned with the respective holes 38 and of inside diameters greater than the holes 38. The holes 38 through the door glass 10 have an inside diameter considerably greater than the outside diameters of the respective bosses 32 so as to accommodate therein the respective bosses 32.
- 35 The screws 24 coaxially extend through or in the respective holes 34, 36, 38, 42 and 44 in such a

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manner that the distal ends of the screws 24 anchor in the respective holes 34 and the heads thereof seat in the respective holes 36. The screws 24 engage the movable plate 18 by means of the threads. The holes
5 36 are recessed at the ends remote from the plate 18 so as to accommodate the heads of the screws 24, so that the screws 24 can rotatably engage the backing plate 20. As the screws 24 are turned, the gap or the distance between the movable and backing plates 18 and
10 20 is varied.

A plurality of the ring spacers 46 are provided between the plates 18 and 20, and extend coaxially through the respective holes 38 and openings 42 and 44. The spacers 46 have an outside diameter substantially equal to
15 the inside diameter of the holes 38, and therefore snugly fit within the respective holes 38. The spacers 46 accommodate the respective screws 24 and the bosses 32. The inside diameters of the spacers 46
20 are considerably greater than the outside diameters of the screws 24 and the bosses 32, so that the spacers 46 do not contact the screws 24 or the bosses 32. As best shown in Figures 3 and 4, each of the spacers 46 consists of a hollow cylindrical core 48 and a layer
25 50 fixed concentrically onto the periphery of the core 48. The core 48 is made of a rigid material, such as metal or synthetic resin. The layer 50 is made of deformable or resilient material, such as rubber fixed to the core 48 by normal adhesion or heat-utilizing
30 adhesion. The layer 50 prevents direct contact between the door glass 10 and the core 48 so as to protect the door glass 10.

Each of the spacers 46 has an axial length greater
35 than the thickness of the door glass 10 but smaller than the sum of the thickness of the door glass 10 and the original or relaxed thicknesses of the packings 28

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and 30 so as to define the minimum gap or distance between the plates 18 and 20. The axial length of each spacer 46 is chosen so that when the screws 24 are tightened until the plates 18 and 20 come into contact with the spacers 46, the plates 18 and 20 will clamp therebetween the door glass 10 by way of the packings 28 and 30 with an optimal magnitude of force exerted on the door glass 10. The optimal magnitude of clamping force is defined as that which ensures the most reliable clamping of the glass plate 10 without damaging it. Thus, it is easy to precisely set the clamping force on the door glass 10 to an optimal level, since the optimal level is obtained by tightening the screws 24 until the plates 18 and 20 come into contact with the spacers 46 and thus the screws 24 cannot be tightened further. The spacers 46 prevent excessive force from being exerted on the door glass 10. It should be noted that each boss 32 has an axial length smaller than that of the respective spacers 46 so as to not come into contact with the backing plate 20.

The considerable difference between the inside diameters of the spacers 46 and the outside diameters of the bosses 32 compensates for tolerance variations between the door glass 10 and the hinges 14, and thus those between the door glass 10 and the vehicle body, thereby facilitating assembly and positional adjustments thereof.

CLAIMS

1. Hinge (14) for a brittle object (10), such as a glass, including a movable member (18) and a backing member (20) which clamp therebetween part of the brittle object and characterized in that it comprises:

(a) a first member (46) pivotally connected to said movable member forming a second member (18);

10 (b) means (24) for adjustably connecting said backing member (20) to said second member (18) in such a manner that the distance between the second and backing members varies as the connecting means is adjusted;

15 (c) first and second deformable packings (28,30) provided between the brittle object (10) and the second member (18), and between the brittle object (10) and the backing member (20), respectively; and

(d) a spacer (46) provided between the second and
20 backing members (18,20), the spacer having a dimension, parallel to the distance between the second and backing members, which is greater than that of the brittle object (10) but smaller than the sum of that of the brittle object and those of the respective packings
25 (28,30) in the original conditions;

whereby when the connecting means (24) is adjusted until the spacer (46) comes into contact with both the second and backing members (18,20) the second and backing members clamp therebetween the brittle object (10)
30 by way of the packings (28,30) with a predetermined force exerted on the brittle object.

2. Hinge as recited in claim 1, characterized in that the packings (28,30) and the brittle object (10) have
35 aligned holes (38,42,44) through which the spacer (46) extends.

3. Hinge as recited in claim 2, characterized in that the spacer (46) consists of a rigid member (48) and a resilient member (50) fixed to the rigid member at positions which may contact the brittle object (10).

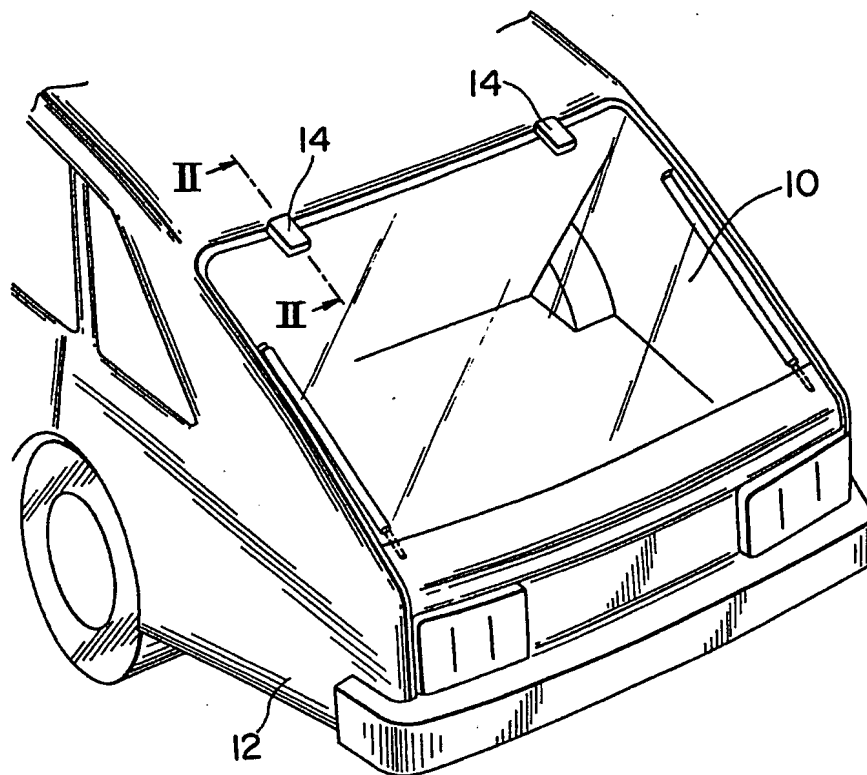
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4. Hinge as recited in claim 3, characterized in that the rigid member (48) is in the form of a hollow cylinder extending parallel to the distance between the second and backing members (18,20), and wherein the
10 resilient member (50) is in the form of a layer fixed to the peripheral surface of the rigid member.

5. Hinge as recited in claim 4, characterized in that the connecting means essentially consists of a screw
15 (24) extending through the hollow of the rigid member (48) and engaging both the second and backing members (18,20).

6. Hinge as recited in claim 5, characterized in that
20 the second and backing members are respectively in the form of plates (18,20) parallel to one another.

7. Hinge as recited in claim 6, characterized in that the brittle object is in the form of a plate (10)
25 parallel to the second and backing members (18,20), and wherein the packings (28,30) are in the form of sheets parallel to the brittle object (10).

$\frac{1}{2}$ **FIG.1**

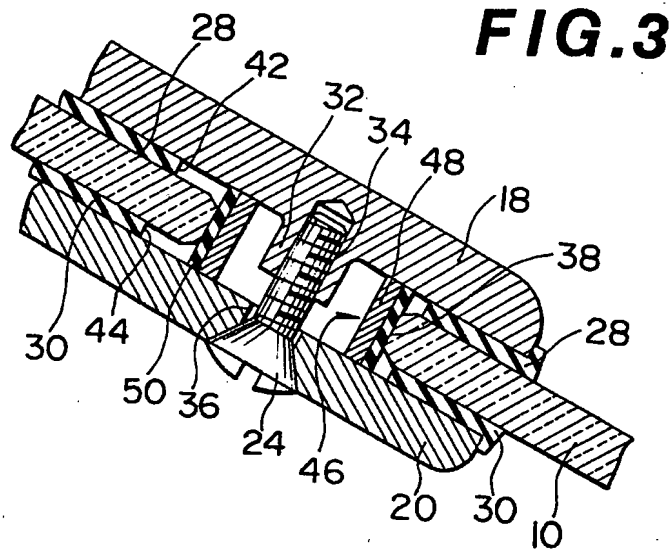
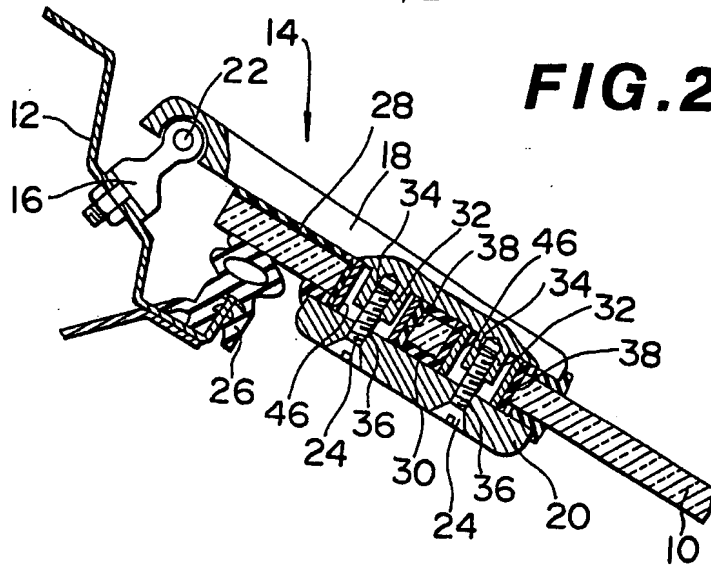
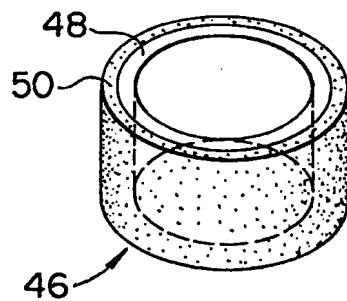


FIG. 4





European Patent
Office

EUROPEAN SEARCH REPORT

0073166

Application number

EP 82 40 1535

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. *)
Y	FR-A-1 491 438 (SAINT GOBAIN) *Page 1, column 2, paragraphs 8,9; page 2, column 1, paragraph 1; figure 1*	1,2,5,6,7	E 05 D 5/02
Y	US-A-2 936 050 (McLAUGHLIN) *Column 1, lines 19-27; column 4, lines 72-75; column 5, lines 1-48; figures 3,10*	1,4,5,6	
A	GB-A-1 207 957 (TONKS) *Page 1, lines 64-93; figures 1,2*	1,2,5,6,7	
A	FR-A-1 262 645 (MIROITERIES DE L'OUEST) *Figure 1*	1	TECHNICAL FIELDS SEARCHED (Int. Cl. *) E 05 D E 06 B F 16 B
A	FR-A-2 215 827 (ELMADUC)		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 19-11-1982	Examiner NEYS B.G.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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